WHAT IS CLAIMED IS:

1. A method for manufacturing a tantalum oxy nitride capacitor comprising:

forming a lower electrode on a surface of a semiconductor substrate using a material selected from the ground consisting of undoped silicon, doped silicon and mixtures thereof;

forming MPS (Metastable Poly Silicon) using gases each containing a silicon source after performing wet etching or dry etching of the lower electrode;

performing MPS doping in a chamber by using a mixed gas comprising P;

depositing a nitride film, in said chamber;

depositing a tantalum oxy nitride thin film using a chemical vapor comprising tantalum on the nitride film;

performing nitrating or nitrifying a surface of the tantalum oxynitride thin film; and

forming an upper electrode by stacking a metal layer on an upper portion of the tantalum oxy nitride thin film.

2. The method for manufacturing a tantalum oxy nitride capacitor according to claim 1, wherein the MPS formation, the MPS doping, the nitride depositing and the tantalum oxy nitride film depositing are performed in said chamber.

3. The method for manufacturing a tantalum oxy nitride capacitor according to claim 1, wherein the wet etching or the dry etching of the lower electrode is performed using a gas comprising HF.

4. The method for manufacturing a tantalum oxy nitride capacitor according to claim 1, wherein the gas comprising HF is selected from the group consisting of hydrogen fluoride/water (HF/H_2O), hydrogen fluoride/hydrogen peroxide (HF/H_2O_2), buffered oxide etchant (BOE), hydrogen fluoride/acetic acid/nitrogen dioxide ($HF/CH_3COOH/NO_2$) and mixtures thereof.

5. The method for manufacturing a tantalum oxy nitride capacitor according to claim 1, wherein the gas comprising a silicon source is used in the MPS formation selected from the group consisting of SiH_4, Si_2H_6, SiH_2Cl_2 and mixtures thereof.

6. The method for manufacturing a tantalum oxy nitride capacitor according to claim 1, wherein the MPS doping is performed under a pressure ranging from about $1.0x10^{-3}$ to about 500 torr and at a temperature ranging from about 500 to about 1000°C.

7. The method for manufacturing a tantalum oxy nitride capacitor according to claim 1, wherein the gas comprising P is a mixed gas comprising PH_3.

8. The method for manufacturing a tantalum oxy nitride capacitor according to claim 7, wherein the mixed gas comprising PH_3 is selected from the group consisting of PH_3/N_2, PH_3/H_2, PH_3/SiH_4, PH_3/Ar and mixtures thereof.

9. The method for manufacturing a tantalum oxy nitride capacitor according to claim 1, wherein the nitride depositing is performed by using NH_3 gas.

10. The method for manufacturing a tantalum oxy nitride capacitor according to claim 9, wherein the nitride depositing is performed under a pressure ranging from about 0.1 to about 200 torr and at a temperature ranging from about 600 to about 850°C.

11. The method for manufacturing a tantalum oxy nitride capacitor according to claim 1, wherein the evaporated tantalum ethylate is the chemical vapor comprising tantalum.

12. The method for manufacturing a tantalum oxy nitride capacitor according to claim 1, wherein the tantalum oxy nitride postprocessing is performed by nitrating the surface under NH_3 (or N_2/H_2) atmosphere or nitrifying the surface under N_2O or O_2 atmosphere.

13. The method for manufacturing a tantalum oxy nitride capacitor according to claim 1, wherein the nitrating or nitrifying is performed at a temperature ranging from about 200 to about 600°C by using a plasma.

14. The method for manufacturing a tantalum oxy nitride capacitor according to claim 1, wherein the upper electrode is formed by depositing a material selected from the group consisting of poly silicon (Poly Si), titanium nitride (TiN), tantalum nitride (TaN), tungsten (W), tungsten nitride (WN), tungsten silicide (Wsi), ruthenium (RU), ruthenium oxide (RuO_2), iridium (Ir), platinum (Pt), individually or repeatedly to form a stacking structure.

15. A semiconductor device comprising a capacitor made in accordance with the method of claim 1.